Aritra Santra

Assistant Professor
Chemical Engineering Department
IIT (ISM) Dhanbad

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I am broadly interested in the study of physics of soft matter and rheology of complex fluids using computer simulations and experimental techniques. Understanding the structure-property relation of soft matter and complex fluids under flowing conditions is one of the core areas of my research. I am also interested in developing new tools for computational and mathematical analysis to understand the behaviour of soft matter and complex fluids.

Education

Name of degree	Institution	University	Year of passing	Percentage of marks/ SGPA
PhD	Monash University	Monash University	2021	
Master of Engineering (Chemical Engineering)	IISc Bangalore	IISc Bangalore	2016	7.5 (scale of 8)
Bachelor of Chemical Engineering	Jadavpur University	Jadavpur University	2014	9.06 (scale of 10)
Higher secondary (10+2)	Jodhpur Park Boy's School	WBCHSE	2010	85.6%
Secondary/ Matriculation (10)	Nava Nalanda High School	WBBSE	2008	94%

Employment History

Name of the organization	Position	Duration
Indian Institute of Technology, (ISM) Dhanbad	Assistant Professor	Dec 2022 - present
Levich Institute, City College of New York	Postdoctoral Researcher	Aug 2021- Dec 2022
Tata Steel Limited	Manager, Process Technology Group	6 months (Aug 2016 – Feb 2017)

Scholastic Achievements

- Dual scholarships: **Monash Graduate Scholarship** (MGS) and **Monash International Postgraduate Research Scholarship** (MIPRS), to conduct doctoral studies at Monash University, (2017-2021).
- **Prof. N R Kuloor Memorial Medal** (Gold Medalist) for best student in Master of Engineering in Chemical Engineering (2016-17), Indian Institute of Science, Bangalore.
- **Kumar Gandhi Award,** for the best Master of Engineering Thesis for the year 2015-16 from Chemical Engineering Department, Indian Institute of Science, Bangalore.
- **Kumar Gandhi Award,** for the best poster in the In-house Symposium, 2016, from Chemical Engineering Department, Indian Institute of Science, Bangalore.
- **All India Rank 17** in the Graduate Aptitude Test for Engineering (GATE), 2014.
- **Ranked 2nd** in Bachelor of Chemical Engineering, Jadavpur University, Kolkata.
- **Summer Research Fellowship (2013),** Indian Academy of Sciences, Bangalore.

Fields of Interest

- Transport phenomena
- Soft matter physics
- Rheology of complex fluids
- Statistical mechanics
- Molecular simulations
- Numerical methods

Skills

Programming Languages: C, C++, Fortran, Python, MATLAB.

Computational packages: MSWord, MSPowerpoint, MSExcel, Latex, COMSOL.

Operating System: Windows, Linux, Mac.

Training and Research Experience

- **Postdoctoral Research Project** on "*Rheology of dense suspensions – flow of chocolate refiner pastes*" at the Levich Institute, City College of New York, from August 2021 to present. This project involves LF-DEM (lubrication flow discrete element method) simulations to study the shear jamming transition in dense suspensions. Additionally, I am also studying the flow characteristics of chocolate refiner pastes using experimental rheology, as a part of an industry funded project. (Advisor: Prof. Jeffrey Morris)
- **PhD Thesis** on "*Dynamics of associative polymer solutions and polymeric rings*" at the **Department of Chemical Engineering, Monash University**. My PhD work involves the study of static, dynamic and rheological properties of associative

polymer solutions and polymeric rings using Brownian dynamics simulations and scaling theory. (Advisor: Prof. Ravi Jagadeeshan)

- **Master of Engineering Thesis Project** on *"DSMC Simulation of High Mach Number Turbulent Flow in Channel"* at the **Department of Chemical Engineering, Indian Institute of Science, Bangalore,** from June 2015 to June 2016**.** In this project I worked on developing DSMC (direct simulation Monte Carlo) simulation algorithm and did linear stability analysis to study high speed gas flows in different flow configurations. (Advisor: Prof. V. Kumaran)
- **Under-graduate Final Year Project** on *"Simulation of Cryogenic Packed Bed for Carbon dioxide Sequestration"* at the **Department of Chemical Engineering, Jadavpur University,** from August 2013 to April 2014. (Advisor: Prof. Kajari KarGupta)
- **Summer Internship Project** on *"Simulation of Hydraulic Jumps on Flat Inclined Plane"* at the **Department of Mechanical Engineering, Indian Institute of Science, Bangalore,** from May to June 2013 as an ***Indian Academy of Sciences fellow***. (Advisor: Dr. Gaurav Tomar)
- **Summer Internship Project** on "*Electric Field Induced Droplet Movement*" at the **Department of Chemical Engineering, Indian Institute of Technology, Kharagpur,** from May to June 2012. (Advisor: Prof. Sunando DasGupta)

Journal Publication

- Aritra Santra, Michel Orsi, Bulbul Chakraborty, Jeffrey F Morris, *Rigid clusters in shear-thickening suspensions: a nonequilibrium critical transition*, 2024, arXiv:2401.15165
- Dominic Robe, Aritra Santra, Gareth McKinley, J Ravi Prakash, *Evanescent Gels: Competition Between Sticker Dynamics and Single-Chain Relaxation*, **Macromol.**, 2024, **57**, 4220-4235.
- Nelya Malbranche, Aritra Santra, Bulbul Chakraborty and Jeffrey F. Morris, *Scaling analysis of shear thickening suspensions*, **Frontiers in Physics**, 2022, **10**, 946221. doi: 10.3389/fphy.2022.946221
- Aritra Santra, and J. Ravi Prakash, *Universality of dilute solutions of ring polymers in the thermal crossover region between θ and athermal solvents*, **J. Rheol.**, 2022, **66**, 775-792.
- Aritra Santra, B. Duenweg and J. Ravi Prakash, *Universal scaling and characterization of gelation in associative polymer solutions*, **J. Rheol.**, 2021, **65**, 549-582. (Featured article, selected for cover page)
- Aritra Santra, Kiran Kumari, Ranjith Padinahateeri, B. Duenweg and J. Ravi Prakash, *Universality of the collapse transition of sticky polymers*, **Soft Matter**, 2019, **15**, 7876-7887.

Conferences

- Aritra Santra and J. Ravi Prakash, *Universality of dilute ring polymer solutions*, **Compflu2023, 18-20 December, 2023, IIT Madras, Chennai, India.**

- Aritra Santra, Gareth H. McKinley and J. Ravi Prakash, *Dynamic signatures of gelation in associative polymer solutions*, **The Society of Rheology 92nd Annual Meeting, 11-14 October 2021, Bangor, Maine, USA.**
- Aritra Santra, Gareth H. McKinley and J. Ravi Prakash, *Dynamic signatures of gelation in associative polymer solutions*, **International Congress of Rheology, 14-17 December 2020, Rio de Janeiro, Brazil.**
- Aritra Santra, B. Duenweg and J. Ravi Prakash, *Universal scaling in associative polymer solutions*, **Statistical Mechanics of Soft Matter Meeting, 16-17 December 2019, Adelaide, Australia.**

Details of Referees

Prof. Ravi Jagadeeshan
Chemical Engineering Department
Monash University
email: ravi.jagadeeshan@monash.edu

Prof. Burkhard Duenweg
Max Planck Institute for Polymer Research
email: duenweg@mpip-mainz.mpg.de

Prof. Viswanathan Kumaran
Chemical Engineering Department
Indian Institute of Science, Bangalore
email: kumaran@iisc.ac.in

Prof. Jeffrey F. Morris
Levich Institute, CCNY
Chemical Engineering Department, CCNY
email: morris@ccny.cuny.edu

Reviewing Activities

- Reviewer for the *Journal of Fluid Mechanics* (Impact factor: 3.627(2020)).

Membership

- The Society of Rheology (USA) (since 2020).
- Australian Society of Rheology (past member).

Extra Curricular Activities

- **Secured first position** in "Chemical Engineering Quiz Competition for UG Final Year Students" organized by IIChE (Indian Institute of Chemical Engineers) in Kolkata, 2014.
- Singing, playing Guitar, music composing.
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Other Information

- **Current Address**:
  Department of Chemical Engineering,
  Indian Institute of Technology (ISM) Dhanbad,
  Jharkhand, India, PIN - 826004

- **Permanent Address**:
  14/1, Nivedita park, Kastha Danga Road,
  Kolkata – 700061. West Bengal, India.

- **Gender**: Male
- **Date of Birth**: 29 July 1992

IISc: Indian Institute of Science; WBCHSE: West Bengal Council of Higher Secondary Education; WBBSE: West Bengal Board of Secondary Education.